

CLAIMS

WHAT IS CLAIMED:

Claim 1. A method for modulating the morphology of cellulosic fibers comprising the steps of

5 subjecting the fibers to a metal ion-activated peroxide treatment carried out at a pH of between about 1 and about 9 and

 subjecting the treated fibers to a refining treatment.

Claim 2. The method of Claim 1 wherein said metal ion is a transitional metal ion.

Claim 3. The method of Claim 1 wherein said metal ion is iron.

10 **Claim 4.** The method of Claim 1 wherein said pH is between about 3 and about 7.

Claim 5. The method of Claim 1 wherein the fibers are subjected to the solution at temperatures between about 40 degrees C to about 120 degrees C.

Claim 6. The method of Claim 1 wherein the fibers are subjected to the solution for between about 10 minutes to about 10 hour.

15 **Claim 7.** The method of Claim 1 wherein said peroxide is present with said solution at a concentration of between about 0.2% and about 5% based on pulp.

Claim 8. The method of Claim 1 wherein said metal ion is present in said solution at a concentration of between about 0.002% and about 0.1% on pulp .

20 **Claim 9.** The method of Claim 1 wherein said pulp is subjected to said solution for a time sufficient to substantially act on at least the cellulose and hemi-cellulose of the pulp, causing oxidation and oxidative degradation of cellulose fibers.

Claim 10. A softwood pulp having a modified morphology , leading to paper making properties substantially functionally equivalent to hardwood pulp papermaking properties.

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Claim 11. The softwood pulp of Claim 10 wherein the fibers of said softwood pulp, after treatment, exhibit a substantially shorter fiber length and distribution, and enhanced fiber collapsibility, than prior to treatment.

Claim 12. The softwood pulp of Claim 9 wherein said pulp is oxidatively degraded
5 relative to untreated softwood pulp.

Claim 13. The softwood pulp of Claim 10 wherein the pulp exhibits a Canadian Standard Freeness of between about 115 and about 590.

Claim 14. The softwood pulp of Claim 13 wherein the pulp exhibits a Kajaani average fiber length of between about 1.0 and 1.9 mm.

10 **Claim 15.** A pulp comprising between about 50% and 90% hardwood pulp and the remainder being softwood pulp which has been subjected to a metal ion-activated peroxide treatment carried out at a pH of between about 2 and about 9 and a refining treatment.

Claim 16. The pulp of Claim 15 wherein said metal ion is a transitional metal.

15 **Claim 17.** The pulp of Claim 15 wherein said metal ion is iron and said pH is between about 3 and about 7.

Claim 18. The pulp of Claim 15 wherein said pulp is substantially functionally equivalent to a hardwood pulp as respects the usefulness of the pulp in papermaking.

20 **Claim 19.** The softwood pulp of Claim 11 wherein the pulp is used to manufacture a paper web material.